CLAIMS

What is claimed is:

1. An axial-flow turbine rotor assembly, comprising:

a bladed ring including

a ring, and

a plurality of turbine blades affixed to the ring and extending radially outwardly from the ring;

a central disk hub; and

a solid state weld joint between the central disk hub and the ring of the bladed ring.

2. The rotor assembly of claim 1, wherein the ring is made of a first material, and the turbine blades are made of a second material.

3. The rotor assembly of claim 1, wherein the ring is made of a first nickel-base superalloy, and the turbine blades are made of a second nickel-base superalloy.

4. The rotor assembly of claim 1, wherein the ring and the central disk hub are made of a first material, and the turbine blades are made of a second material.

5. The rotor assembly of claim 1, wherein the ring and the central disk hub are made of a first nickel-base superalloy, and the turbine blades are made of a second nickel-base superalloy.

6. The rotor assembly of claim 1, wherein the ring is made of a first material, the turbine blades are made of a second material, and the central disk hub is made of a third material.

7. The rotor assembly of claim 1, wherein the ring has a first grain size, the central disk hub has a second grain size smaller than the first grain size, and the solid state weld joint has a third grain size smaller than the second grain size.

8. The rotor assembly of claim 1, wherein the turbine blades are bonded to the ring.

9. The rotor assembly of claim 1, wherein the turbine blades are mechanically affixed to the ring but not bonded to the ring.

10. The rotor assembly of claim 1, wherein the weld joint is a solid state inertia weld joint.

11. An axial-flow turbine rotor assembly, comprising:

a bladed ring including

a ring made of a first nickel-base superalloy, and

a plurality of turbine blades bonded to the ring and extending radially outwardly from the ring, wherein the turbine blades are made of a second nickel-base superalloy;

a central disk hub made of the first nickel-base superalloy; and

a solid state weld joint between the central disk hub and the ring of the bladed ring.

12. The rotor assembly of claim 11, wherein the ring has a first grain size, the central disk hub has a second grain size smaller than the first grain size, and the solid state weld joint has a third grain size smaller than the second grain size.

13. A method for preparing a rotor assembly of an axial flow turbine engine, comprising the steps of

providing a bladed ring, wherein the step of providing the bladed ring includes the step of

bonding a plurality of turbine blades to a ring so that the turbine blades extend outwardly from the ring;

providing a central disk hub; and

solid-state inertia welding the central disk hub and the ring of the bladed ring at a

solid state weld joint.

14. The method of claim 13, wherein the step of bonding includes the step of diffusion bonding the plurality of turbine blades to the ring.

15. The method of claim 13, wherein the step of providing the bladed ring produces a ring having a coarser grain structure than the central disk hub resulting from the step of providing the central disk hub.

16. The method of claim 13, wherein the step of providing a bladed ring includes the step of

providing a ring having an inner surface that does not lie perpendicular to a radial direction of the rotor assembly, and

the step of providing the central disk hub includes the step of

providing the central disk hub having an outer surface that does not lie perpendicular to the radial direction, and wherein the inner surface and the outer surface have substantially the same angle relative to the radial direction and are conformably shaped.

17. The method of claim 13, wherein the step of solid-state inertia welding includes the step of

rotating at least one of the central disk hub and the bladed ring about a rotational axis with the central disk hub and the bladed ring separated from each other, and

moving the central disk hub and the bladed ring into contact in a direction parallel to the rotational axis, wherein the contact occurs at the solid-state weld joint.

18. The method of claim 13, wherein the step of bonding is completed prior to a commencement of the step of solid-state inertia welding.